

## Weather in India

### POST MONSOON SEASON (October-December 2006)†

#### 1. Introduction

One of the remarkable features of the post monsoon season 2006 was the suppressed cyclonic storm activity over the Bay of Bengal and the Arabian sea. Only one cyclonic storm formed over the Bay of Bengal as against the 2 Cyclonic Storms and 3 Depressions formed over the Bay last year.

The Cyclonic Storm ‘Ogni’ formed over the Bay of Bengal showed characteristics similar to that of a midget cyclone and posed many challenges to the forecasting community regarding the issuance of warnings as mandatory with the pre-cyclone watch with sufficient lead time. The 3 Doppler RADARs along the east coast also proved their worthiness when put into real test in the close proximity of a Cyclonic Storm. Though the remnant of the typhoon Durian entered the Bay of Bengal, it did not intensify due to strong vertical wind shear. It moved along the southern periphery of the ridge line and gave rainfall over Tamil Nadu, Rayalaseema and south Coastal Andhra Pradesh.

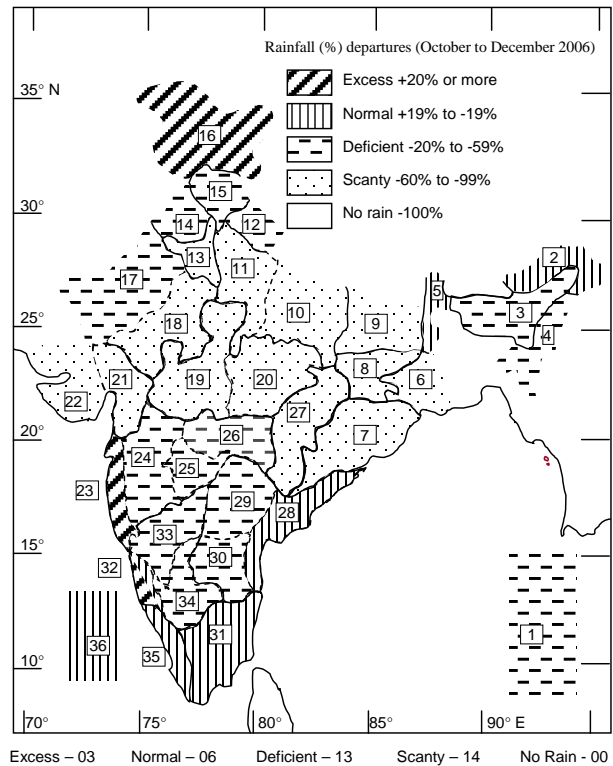
The southwest monsoon withdrew from the entire country on 17 October. Subsequently, the northeast monsoon rains commenced over Tamil Nadu, Kerala and adjoining parts of Karnataka and Andhra Pradesh on 19 October. The temporal distribution of this rainfall had been quite erratic and by the end of the season, Tamil Nadu, Kerala and coastal Andhra Pradesh received *normal*\* rainfall while the other two sub-divisions viz., south interior Karnataka and Rayalaseema remained *deficient*. The rainfall received by the interior districts of Tamil Nadu were also *deficient*.

The later part of December witnessed persistent fog situations over the northern parts of the country, which disrupted road, rail and air transport for nearly 3 weeks in succession.

#### 2. Seasonal rainfall (October-December)

Out of the 36 meteorological sub-divisions, rainfall was *excess* in 3, *normal* in 6, *deficient* in 13, and *scanty* in

\* Definition of terms in ‘Italics’ are given in Appendix.



**Fig. 1.** Sub-divisionwise seasonal rainfall departure from normal (%) for Post monsoon season (October to December 2006). Sub-divisions are indicated by number on the map & bold letters in legend. The rainfall anomaly values for these 36 sub-divisions are indicated below :

<b>1</b>	-24	<b>7</b>	-61	<b>13</b>	-65	<b>19</b>	-77	<b>25</b>	-40	<b>31</b>	15
<b>2</b>	-04	<b>8</b>	-83	<b>14</b>	-28	<b>20</b>	-79	<b>26</b>	-27	<b>32</b>	32
<b>3</b>	-46	<b>9</b>	-68	<b>15</b>	-45	<b>21</b>	-75	<b>27</b>	-61	<b>33</b>	-44
<b>4</b>	-54	<b>10</b>	-80	<b>16</b>	65	<b>22</b>	-95	<b>28</b>	03	<b>34</b>	-26
<b>5</b>	-19	<b>11</b>	-71	<b>17</b>	-20	<b>23</b>	50	<b>29</b>	-36	<b>35</b>	18
<b>6</b>	-65	<b>12</b>	-65	<b>18</b>	-94	<b>24</b>	-41	<b>30</b>	-23	<b>36</b>	-12

14 sub-divisions. The detailed rainfall departures from normal are shown in Fig. 1 and Table 1.

The tracks followed by the systems in westerlies being to the extreme northern parts, only Jammu & Kashmir benefited from these. The near absence of intense systems and the erratic behaviour of easterly troughs caused lesser rainfall over the southern peninsula as well.

†Compiled by : A. B. Mazumdar, R. R. Lele and Sunitha Devi S., Meteorological Office, Pune – 411 005, India

**TABLE 1**  
**Sub-divisionwise rainfall (mm) for each month and season as a whole (October-December 2006)**

S. No.	Meteorological sub-divisions	October			November			December			Season		
		Actual (mm)	Normal (mm)	Dep. (%)	Actual (mm)	Normal (mm)	Dep. (%)	Actual (mm)	Normal (mm)	Dep. (%)	Actual (mm)	Normal (mm)	Dep. (%)
1.	A. & N. Islands	378	305	24	77	236	-68	75	159	-53	530	700	-24
2.	Arunachal Pradesh	89	166	-46	123	42	191	23	35	-35	235	244	-4
3.	Assam & Meghalaya	82	154	-46	19	25	-23	8	27	-68	110	206	-46
4.	Naga., Mani, Mizo. and Tri.	75	145	-48	12	40	-71	3	10	-73	90	195	-54
5.	Sub-Himalayan West Bengal & Sikkim	124	155	-20	19	18	8	6	10	-45	148	183	-19
6.	Gangetic West Bengal	46	130	-65	10	23	-57	0	6	-100	56	159	-65
7.	Orissa	28	121	-77	32	28	13	0	5	-100	60	155	-61
8.	Jharkhand	13	86	-85	4	10	-61	0	5	-100	17	100	-83
9.	Bihar	22	69	-68	3	5	-54	1	4	-88	25	79	-68
10.	East Uttar Pradesh	10	52	-81	1	4	-78	1	6	-80	12	62	-80
11.	West Uttar Pradesh	13	40	-68	1	4	-83	1	7	-80	15	51	-71
12.	Uttaranchal	8	56	-86	1	9	-89	22	22	1	31	87	-65
13.	Haryana, Chandigarh & Delhi	4	16	-78	2	5	-57	4	7	-41	9	27	-65
14.	Punjab	14	21	-35	8	5	47	8	15	-43	30	41	-28
15.	Himachal Pradesh	15	46	-68	12	20	-41	35	46	-23	61	111	-45
16.	Jammu & Kashmir	47	36	30	74	32	129	131	84	56	252	153	65
17.	West Rajasthan	6	4	35	**	3	-97	1	2	-33	7	9	-20
18.	East Rajasthan	1	15	-91	**	7	-99	**	4	-96	2	26	-94
19.	West Madhya Pradesh	8	32	-74	3	13	-76	**	7	-95	12	52	-77
20.	East Madhya Pradesh	3	39	-91	9	12	-25	**	9	-99	12	59	-79
21.	Gujarat region	8	22	-64	1	11	-90	0	2	-100	9	35	-75
22.	Saurashtra & Kutch	1	14	-96	**	11	-98	1	1	-56	1	26	-95
23.	Konkan & Goa	196	105	87	7	26	-72	0	4	-100	203	135	50
24.	Madhya Maharashtra	55	71	-22	7	28	-76	**	6	-99	62	105	-41
25.	Marathawada	54	67	-19	3	22	-85	0	7	-100	58	96	-40
26.	Vidarbha	39	53	-26	16	15	7	0	7	-100	55	75	-27
27.	Chattisgarh	14	67	-79	18	10	81	**	5	-98	32	82	-61
28.	Coastal Andhra Pradesh	219	197	11	105	104	2	10	26	-60	335	326	3
29.	Telangana	32	84	-63	39	21	85	0	5	-100	70	110	-36
30.	Rayalaseema	71	121	-41	81	66	22	12	24	-50	164	212	-23
31.	Tamil Nadu	257	181	42	213	165	29	27	85	-68	497	432	15
32.	Coastal Karnataka	242	179	35	100	66	52	**	14	-99	341	258	32
33.	North interior Karnataka	44	103	-57	32	28	14	0	6	-100	76	137	-44
34.	South interior Karnataka	59	139	-57	87	48	82	1	13	-92	148	200	-26
35.	Kerala	375	292	29	213	164	30	2	43	-96	590	499	18
36.	Lakshadweep	119	153	-22	159	117	36	11	59	-82	289	329	-12

\*\* Rainfall amount from 0.1 to 0.4 mm; amounts less than 0.1 mm are rounded off to 0.

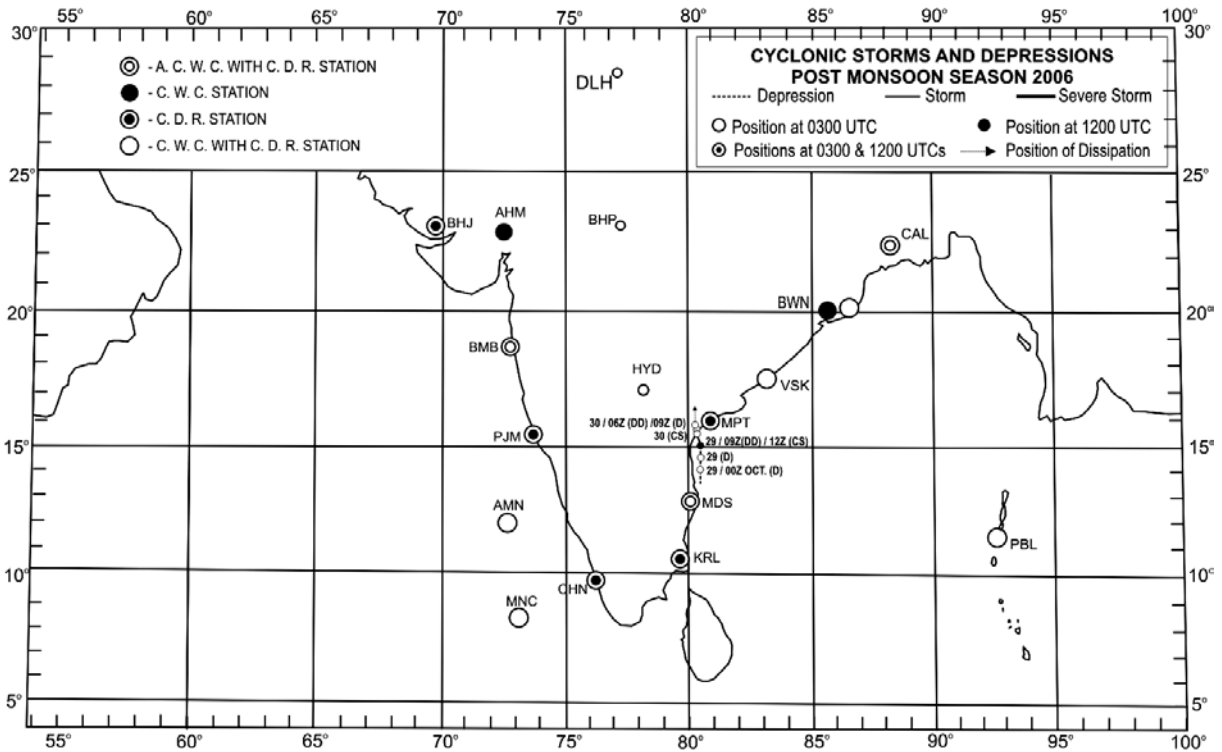


Fig. 2. Tracks of cyclonic storms and depressions during the period October to December 2006

3. Monthly features

3.1. October

3.1.1. Withdrawal of southwest monsoon

The southwest monsoon withdrew from most parts of north India, central India and parts of Peninsula by 9 October. By 16 October, the withdrawal was completed from the country outside the south Peninsula. Subsequently on 17 October, it withdrew from the entire country, the Bay of Bengal and the Arabian Sea, with a delay of 2 days from the normal date.

3.1.2. Commencement of northeast monsoon rains

This time, there had been a clear cut demarcation between the two monsoon regimes. The northeast monsoon rains commenced over the southern peninsula from 19 October.

3.1.3. Storms and depressions

Only one cyclonic storm (Ogni) formed over the Bay of Bengal during the month. The details are given below :

3.1.3.1. Cyclonic Storm (Ogni) over the west central Bay (29 - 30 October 2006)

A Depression formed over the west central Bay at 0000 UTC of 29 and lay centred near Lat. 14.0° N / Long. 80.5° E (about 50 km east of Nellore). It moved slightly northwards and intensified into a Deep Depression at 0900 UTC of 29 near Lat. 15.0° N / Long. 80.5° E (about 50 km east of Kaveli). Remaining practically stationary, it further intensified into a Cyclonic Storm (Ogni) at 1200 UTC of 29. Moving slightly northnorthwestwards, it lay centred near Lat. 15.6° N / Long. 80.3° E (close to Ongole) at 0300 UTC of 30. It continued to move in a northnorthwesterly direction, weakened into a Deep Depression at 0600 UTC of 30, near Lat. 15.7° N / Long. 80.3° E and crossed south Andhra coast between Ongole and Bapatla by noon. Moving further in a northerly direction, it weakened into a Depression at 0900 UTC near Lat. 15.8° N / Long. 80.3° E and into a well marked low pressure area at 1200 UTC over south coastal Andhra Pradesh and neighbourhood. It rapidly weakened and became less marked thereafter. The track of this system is shown in Fig. 2.

The maximum intensity as given by Kalpana-1 imagery was T-2.5 from 1500 UTC of 29 to 0600 UTC of 30. As per satellite observations, the system disorganized at 1000 UTC of 30 over land. The system was tracked by Kalpana-1, DWR Chennai, Machilipatnam and Sriharikota.

Fairly widespread to widespread rainfall activity with heavy to very heavy rain at a few places and (extremely heavy rainfall at isolated places) over south coastal Andhra Pradesh from 28 October – 3 November and over Tamil Nadu from 26 – 29 October were reported. The chief amounts of rainfall in cm are:

#### Andhra Pradesh

28 Oct 2006	Palasa 11
29 Oct 2006	Ongole 19, Amalapuram, Kakinada & Kandukur 13 each
30 Oct 2006	Avanigadda 35, Repalle 28, Machilipatnam 27, Bapatla 20, Amalapuram 16
31 Oct 2006	Gudivada 55, Machilipatnam 34, Avanigadda 32, Narsapur 22, Repalle & Vijaywada 19 each
1 Nov 2006	Machilipatnam 17, Chinoor 12
2 Nov 2006	Dharmavaram 11
3 Nov 2006	Kalyandurg 19, Avanigadda 11

#### Tamil Nadu

26 Oct 2006	Chennai & Red Hills 14 each
27 Oct 2006	Parangipettai 14, Cuddalore 12
28 Oct 2006	Panruti 16, Kovilpatti 15, Chennai 14
29 Oct 2006	Chennai 19, Tiruvallur 18, Red Hills 13

According to media reports, the storm claimed 28 lives and about 35,000 livestock. It disrupted road/rail traffic. Crops in thousands of hectares were submerged in Prakasam, Guntur & Krishna districts. Strong winds were experienced by fishermen even far away from the coast and some of them were missing during the period 29 October to 2 November.

#### 3.1.4. Weather and associated synoptic features

Table 2 gives the summary of synoptic features for the month of October 2006.

Southwest monsoon was *vigorous* on 1 day each in Konkan & Goa, Vidarbha, coastal Karnataka and Kerala, *active* on 3 days in Sub-Himalayan West Bengal & Sikkim and on 1 day each in Nagaland-Manipur-Mizoram-Tripura, Orissa, Konkan & Goa, coastal & south interior Karnataka and Kerala. Subsequently, the northeast monsoon was *vigorous* on 4 days each in coastal Andhra Pradesh and 2 days in Tamil Nadu, *active* on 5 days in Tamil Nadu, 4 days in Kerala and on 1 day in Rayalaseema.

*Extremely heavy rain* occurred on 2 days in coastal Andhra Pradesh and on 1 day in Tamil Nadu. *Very Heavy rain* occurred on 7 days in Tamil Nadu, 5 days in Kerala and on 1 to 3 days in Andaman & Nicobar Islands, Assam & Meghalaya, Konkan & Goa, coastal Andhra Pradesh and coastal & south interior Karnataka. *Heavy rain* occurred on: 12 days in Tamil Nadu; 4 to 6 days in Andaman & Nicobar Islands, Sub-Himalayan West Bengal & Sikkim, coastal Andhra Pradesh, coastal Karnataka and Kerala; 3 days in Assam & Meghalaya and on 1 to 2 days in Orissa, Bihar, Konkan & Goa, Vidarbha, Rayalaseema and north interior Karnataka.

Rain or thundershowers occurred either *at most places* or *at many places* on: 14 days in Kerala; 7 to 9 days in Andaman & Nicobar Islands, Sub-Himalayan West Bengal & Sikkim, Tamil Nadu and coastal Karnataka; 4 days each in Orissa, Konkan & Goa, coastal Andhra Pradesh and Lakshadweep and on 1 to 2 days in Arunachal Pradesh, Assam & Meghalaya, Nagaland-Manipur-Mizoram-Tripura, Gangetic West Bengal, Punjab, Himachal Pradesh, Jammu & Kashmir, Madhya Maharashtra, Marathawada, Vidarbha, Rayalaseema and south interior Karnataka. It occurred *at scattered* or *at isolated* places on: 22 to 26 days in coastal Andhra Pradesh, Rayalaseema, Tamil Nadu and south interior Karnataka; 15 to 18 days in Andaman & Nicobar Islands, Arunachal Pradesh, Assam & Meghalaya, Gangetic West Bengal, Orissa, Telangana, coastal & south interior Karnataka, Kerala and Lakshadweep; 13 to 14 days in Nagaland-Manipur-Mizoram-Tripura, Bihar, Konkan & Goa and Madhya Maharashtra, 5 to 9 days in Sub-Himalayan West Bengal & Sikkim, Jharkhand, Uttar Pradesh, Uttaranchal, Haryana, Himachal Pradesh, Jammu & Kashmir, Madhya Pradesh, Gujarat region, Marathawada, Vidarbha and Chattisgarh; 3 days each in

TABLE 2

## Details of the weather systems during October 2006

S. No. (1)	System (2)	Duration (3)	Place of first location (4)	Direction of movement (5)	Place of final location (6)	Remarks (7)
<b>(A) Cyclonic storm</b>						
1	Cyclonic Storm (Ogni)	29 – 30	West central Bay	Initially northnorthwest and then north	South coastal Andhra Pradesh and neighbourhood	Details are given in the text
<b>(B) Western disturbances /eastward moving systems</b>						
<i>(i) Upper air cyclonic circulations</i>						
1.	Mid tropospheric levels	13 – 14	North Pakistan and adjoining Jammu & Kashmir	Northeast	Jammu & Kashmir	Moved away on 15
2.	Do	15 – 17	Do	Do	Northern parts of Jammu & Kashmir	Moved away on 18
3.	Do	13 – 14	Punjab and neighbourhood	Do	Himachal Pradesh and adjoining Uttaranchal	Moved away on 15
4.	Do	18 – 19	North Pakistan and adjoining Jammu & Kashmir	Do	Northern parts of Jammu & Kashmir	Moved away on 20
5.	Do	20 – 21	do	Do	Do	Moved away on 22
6.	Do	21 – 24	North Pakistan	Do	Do	Moved away on 25
7.	Do	25 – 26	North Pakistan and adjoining Jammu & Kashmir	Do	Jammu & Kashmir and adjoining north Pakistan	Moved away on 27
<i>(ii) Induced cyclonic circulation</i>						
1.	Mid tropospheric levels	18 – 27	Central Pakistan	Do	West Uttar Pradesh and adjoining Uttaranchal	Less marked on 28
<i>(iii) Trough in westerlies</i>						
1.	Lower levels	4 – 5	Sub-Himalayan West Bengal & Sikkim to north Bay	Stationary	<i>In situ</i>	Less marked on 6
2.	Mid tropospheric levels	6 – 7	Long. 90° E, to the north of Lat. 15° N	Do	Do	Less marked on 8
3.	Do	14 – 15	Long. 70° E, to the north of Lat. 25° N	East	Long. 80° E, to the north of Lat. 30° N	Less marked on 16
4.	Mid & upper tropospheric levels	19 – 24	Long. 83° E, to the north of Lat. 20° N	Northeast	Long. 88° E, to the north of Lat. 20° N	Moved away on 25
5.	Do	31 Oct – 1 Nov	Long. 75° E, to the north of Lat. 25° N	East	Long. 77° E, to the north of Lat. 25° N	Moved away on 2 November
<b>(C) Other upper air cyclonic circulations</b>						
1.	Mid tropospheric levels	4 – 6	South Andaman Sea and neighbourhood	Northwest	–	Merged with the cyclonic circulation over east-central and adjoining northeast Bay on 7
2.	Do	7 – 11	East-central and adjoining northeast Bay	Do	Nagaland-Manipur-Mizoram-Tripura and adjoining areas	Tilted southwards with height on 7. Became less marked on 12 <sup>th</sup>

TABLE 2(Contd.)

(1)	(2)	(3)	(4)	(5)	(6)	(7)
3.	Mid tropospheric levels	8 – 11	Southwest Bay and adjoining west–central Bay off north Tamil Nadu coasts	West	Kerala and adjoining areas	Less marked on 12
4.	Do	12 – 16	Southwest Bay and adjoining west–central Bay off north Tamil Nadu –south Andhra coasts	West	Southeast Arabian Sea and adjoining Lakshadweep area	Moved away westwards on 17
5.	Do	15	North Bay off west Bengal–Orissa coast	Stationary	<i>In situ</i>	Less marked on 16
6.	Lower tropospheric levels	22 – 23	Central parts of Rajasthan	Do	Do	Less marked on 24
7.	Mid tropospheric levels	31 Oct – 1 Nov	Rayalaseema and neighbourhood	Quasi–stationary	Telangana	Less marked on 2 November
8.	Mid tropospheric levels	27 Oct – 1 Nov	Lakshadweep–Maldives areas	Do	Lakshadweep area off Kerala coast	Became unimportant on 2 November
<b>(D) Troughs in easterlies</b>						
1.	At sea level	17 – 18	Southwest Bay	Stationary	<i>In situ</i>	Less marked on 19
2.	Do	22 – 28	Southeast Bay and adjoining north Indian Ocean	Northwest	Southwest and adjoining west–central Bay off Tamil Nadu–Andhra coasts	Merged with the Depression on 29. It was seen with an embedded low pressure area over central parts of coastal Tamil Nadu and adjoining southeast Bay on 28
3.	In lower levels	19–25	Southwest and adjoining west–central Bay off Tamil Nadu–south Andhra coasts	West	Southeast ArabianSea	Less marked on 26
4.	Do	26 – 29	Lakshadweep area off Kerala coast	North	Kerala–Karnataka coasts	Less marked on 30
5.	Do	30 Oct – 4 Nov	Southeast Bay	Westnorthwest	Southwest Bay and adjoining west–central Bay off Tamil Nadu–Andhra coasts	Less marked on 5 November
<b>(E) Off–shore trough</b>						
1.	At Sea level	5 – 9	North Maharashtra to Karnataka coasts	Quasi–stationary	South Maharashtra to Kerala coasts	Less marked on 10

Punjab, east Rajasthan and Saurashtra & Kutch and on 1 day in west Rajasthan.

### 3.1.5. Monthly rainfall

Monthly rainfall was: *excess* in 7 met. sub-divisions *viz.*, Andaman & Nicobar, Jammu & Kashmir, west

Rajasthan, Konkan & Goa, Tamil Nadu, coastal Karnataka and Kerala; *normal* in 2 *viz.*, Marathawada and coastal Andhra Pradesh; *deficient* in 11 *viz.*, Arunachal Pradesh, Assam & Meghalaya, Nagaland-Manipur-Mizoram-Tripura, Sub-Himalayan West Bengal & Sikkim, Punjab, Madhya Maharashtra, Vidarbha, Rayalaseema, north interior Karnataka, south interior Karnataka and

TABLE 3

## Details of the weather systems during November 2006

S. No. (1)	System (2)	Duration (3)	Place of first location (4)	Direction of movement (5)	Place of final location (6)	Remarks (7)
<b>(A) Low pressure areas</b>						
1.	Low pressure area	19 – 23	Lakshadweep & adjoining southeast and east-central Arabian Sea	West	Southwest and adjoining west-central Arabian Sea	It was seen as an upper air cyclonic circulation extending upto mid tropospheric levels over Commorin–Maldives areas on 16. A trough from this system extended northeastwards to Konkan on 21 & 22. The low pressure area moved away westwards on 24
<b>(B) Western disturbances/eastward moving systems</b>						
<i>(i) Upper air cyclonic circulations</i>						
1.	Mid tropospheric levels	3 – 6	North Pakistan and adjoining Jammu & Kashmir	Northeast	Jammu & Kashmir and neighbourhood	Moved away northwards across Kashmir and neighbourhood on 7
2.	Do	7 – 9	Do	Do	North Pakistan and adjoining Jammu & Kashmir	Moved away on 10
3.	Do	11 – 14	Do	Do	Do	Moved away on 15
4.	Do	15 – 21	Do	Do	Do	Moved away on 22
5.	Do	22 – 26	Do	Do	Do	Moved away on 27
6.	Do	27	Do	Do	Do	Moved away on 28
<i>(ii) Induced systems</i>						
1.	Lower & mid tropospheric levels	30 Nov – 3 Dec	Punjab and neighbourhood	Northeast	Uttaranchal and neighbourhood	Less marked on 4 December
<i>(iii) Troughs in westerly</i>						
1.	Mid and upper tropospheric levels	2 – 4	North Pakistan to west-central Arabian Sea	Northeast	West Uttar Pradesh to east-central Arabian Sea to the north of Lat. 12° N	Moved away on 5
2.	Do	8 – 11	Uttaranchal to east-central Arabian Sea to the north of 15° N	Do	Long. 83° E to the north of Lat. 15° N	Less marked 12
3.	Mid tropospheric levels	27 – 28	Sub-Himalayan West Bengal & Sikkim to north Bay	East	Assam & Meghalaya to northeast Bay	Less marked on 29
<b>(C) Other upper air cyclonic circulations</b>						
1.	Mid tropospheric levels	2 – 3	Gujarat State and adjoining areas	Stationary	<i>In situ</i>	Less marked on 4
2.	Do	9 – 10	Southwest and adjoining west-central Bay	North	Southwest Bay and adjoining south Tamil Nadu.	Less marked on 11
3.	Lower tropospheric levels	9 – 12	Tamil Nadu and adjoining Commorin area	West	Lakshadweep – Maldives areas	Less marked on 13

TABLE 3(Contd.)

(1)	(2)	(3)	(4)	(5)	(6)	(7)
4.	Mid tropospheric levels	19 – 26	Southwest Bay and adjoining Sri Lanka	West	Lakshadweep and adjoining southeast Arabian Sea	Less marked on 27. A trough extended northward from this system to north Konkan on 25 & 26
5.	Lower tropospheric levels	24 – 25	Madhya Maharashtra & adjoining Marathawada	North	North Madhya Maharashtra	Less marked on 26
<b>(D) Troughs in easterlies</b>						
1.	At sea level	7 – 17	Southwest Bay off Tamil Nadu coast	Northwest	Southwest and adjoining west-central Bay off Tamil Nadu – Andhra coasts	It was embedded in the active easterly wave. Less marked on 18
2.	Lower levels	2 – 8	Southeast Arabian Sea to Gujarat State	Stationary	<i>In situ</i>	Less marked on 9
3.	At sea level	11	Southeast Arabian Sea and adjoining Lakshadweep–Maldives areas	Do	Do	Less marked on 12
4.	Do	25 Nov – 11 Dec	Southwest Bay	Westward	South Arabian Sea	Moved away on 12
5.	Do	27	Southeast and adjoining east-central Arabian Sea	Do	Southwest Arabian Sea	Less marked on 28
6.	Do	28 Nov – 3 Dec	Commorin–Maldives areas	Do	Southeast Arabian Sea	Less marked on 4 December
7.	Do	29 Nov – 3 Dec	Southwest Arabian Sea	Do	Do	Do
8.	Lower levels	28 – 29	Kerala to Gujarat Region	Do	Lakshadweep to Madhya Maharashtra	Less marked on 30

Lakshadweep and *scanty* in the remaining 16 viz., Gangetic West Bengal, Orissa, Jharkhand, Bihar, east Uttar Pradesh, west Uttar Pradesh, Uttaranchal, Haryana, Himachal Pradesh, east Rajasthan, west Madhya Pradesh, east Madhya Pradesh, Gujarat Region, Saurashtra & Kutch, Chattisgarh and Telangana. The sub-divisionwise percentage departures from normal and significant amounts of rainfall are given respectively in Tables 1 & 5.

### 3.1.6. Temperature

Day temperatures were *appreciably* to *markedly above normal* on : 15 to 17 days in Uttar Pradesh, east

Rajasthan, west Madhya Pradesh and Konkan & Goa; 10 to 13 days in Jharkhand, Uttaranchal, Himachal Pradesh, Jammu & Kashmir, east Madhya Pradesh, Saurashtra & Kutch and Chattisgarh; 7 to 9 days in Assam & Meghalaya, Vidarbha and coastal Karnataka; 4 to 6 days in Arunachal Pradesh, Nagaland-Manipur-Mizoram-Tripura, Sub-Himalayan West Bengal & Sikkim, west Rajasthan, Orissa, Haryana, Gujarat region, Madhya Maharashtra, coastal Andhra Pradesh and on 1 to 3 days in Bihar, Punjab, Telangana, Rayalaseema and south interior Karnataka and were *above normal* on: 13 days in Madhya Maharashtra; 8 to 10 days in Jharkhand, Bihar, east Uttar Pradesh, Uttaranchal, Haryana, Punjab and Himachal Pradesh; 4 to 7 days in Assam & Meghalaya, Nagaland-



Manipur-Mizoram-Tripura, Sub-Himalayan West Bengal & Sikkim, Orissa, Rajasthan, Gujarat region, Vidarbha, Chattisgarh, Telangana, Rayalaseema, coastal & south interior Karnataka and Kerala and on 1 to 3 days in Arunachal Pradesh, Gangetic West Bengal, west Uttar Pradesh, Jammu & Kashmir, Madhya Pradesh, Saurashtra & Kutch, Konkan & Goa, Marathawada, coastal Andhra Pradesh, Tamil Nadu and north interior Karnataka. They were *appreciably to markedly below normal* on: 4 to 8 days in Haryana, Punjab, Jammu & Kashmir, west Rajasthan and Tamil Nadu and on 1 to 3 days in Arunachal Pradesh, Assam & Meghalaya, Sub-Himalayan West Bengal & Sikkim, Uttar Pradesh, Uttaranchal, Himachal Pradesh, east Rajasthan, coastal Andhra Pradesh, north interior Karnataka and Kerala and were *below normal* on: 4 to 7 days in Haryana, Rajasthan, Gujarat region and on 1 to 3 days in Gangetic West Bengal, Bihar, west Uttar Pradesh, Punjab, Jammu & Kashmir, Madhya Pradesh, Saurashtra & Kutch, Telangana, Rayalaseema and Tamil Nadu.

The month's highest maximum temperature in the plains of the country was 41.1° C recorded at Churu (west Rajasthan) on 4 October 2006.

Night temperatures were *appreciably to markedly below normal* on: 8 days in Orissa; 3 to 4 days in Assam & Meghalaya, Jharkhand, east Uttar Pradesh, Uttaranchal and on 1 to 2 days in Sub-Himalayan West Bengal & Sikkim, Bihar, Haryana, Punjab, Rajasthan and Kerala and were *below normal* on: 7 to 10 days in Assam & Meghalaya, Jharkhand, Bihar, east Uttar Pradesh; 3 to 5 days in Sub-Himalayan West Bengal & Sikkim, Orissa, west Uttar Pradesh, Uttaranchal, Punjab, Madhya Maharashtra and Tamil Nadu and on 1 to 2 days in Nagaland-Manipur-Mizoram-Tripura, Gangetic West Bengal, Haryana, Himachal Pradesh, Jammu & Kashmir, west Rajasthan, west Madhya Pradesh, Gujarat region, Marathawada and coastal Andhra Pradesh. They were *appreciably to markedly above normal* on: 25 days in east Rajasthan; 23 days in west Rajasthan; 12 to 18 days in Haryana, Jammu & Kashmir, Madhya Pradesh and Gujarat region; 9 days each in Saurashtra & Kutch and Madhya Maharashtra; 3 to 5 days in Sub-Himalayan West Bengal & Sikkim, Uttar Pradesh, Himachal Pradesh, Vidarbha and on 1 to 2 days in Nagaland-Manipur-Mizoram-Tripura, Gangetic West Bengal, Orissa, Bihar, Uttaranchal, Punjab, Konkan & Goa, Marathawada, and Telangana and were *above normal* on: 8 to 12 days in Uttar Pradesh, Uttaranchal, west Madhya Pradesh and Gujarat state; 4 to 7 days in Assam & Meghalaya, Bihar, Haryana, Punjab, Himachal Pradesh, Rajasthan, east Madhya Pradesh, Konkan & Goa, Madhya Maharashtra,

Vidarbha, Chattisgarh, Telangana and coastal Karnataka and on 1 to 3 days in Arunachal Pradesh, Nagaland-Manipur-Mizoram-Tripura, West Bengal & Sikkim, Orissa, Jharkhand, Jammu & Kashmir, Marathawada, coastal Andhra Pradesh, Rayalaseema, Tamil Nadu and interior Karnataka.

The month's lowest minimum temperature in the plains of the country was 11.8° C, recorded at Pilani (east Rajasthan) on 29 October 2006.

### 3.1.7. *Disastrous weather events and associated damage*

As stated earlier, the cyclonic storm 'Ogni' claimed 28 lives and disrupted rail/road traffic. Crops in thousands of acres were submerged in Prakasam, Guntur and Krishna districts of Andhra Pradesh. The heavy rains and lightning claimed 22 lives in Vidarbha, 13 in Orissa, 12 each in Tamil Nadu and Kerala and 5 in West Bengal. Also many houses collapsed in Tamil Nadu and Kerala. Heavy rains caused extensive damage to standing crops in Jharkhand, Kerala, Vidarbha and Madhya Pradesh. Thunderstorm and hail storm claimed the lives of 4 people in various districts of Assam & Meghalaya. The squally winds uprooted trees, blew away the roofs of many houses and disrupted electric and telecommunication lines. Many cattles also died in Orissa and Jharkhand.

## 3.2. *November*

### 3.2.1. *Storms and depressions*

Unlike the previous years, no storm or depression formed during the month.

### 3.2.2. *Weather and associated synoptic features*

Summary of the synoptic systems for the month of November 2006 are given in Table 3.

Northeast monsoon was *vigorous* on 3 days in Rayalaseema, 2 days each in coastal Andhra Pradesh and Kerala and on 1 day in Tamil Nadu. It was active on 4 days in Tamil Nadu, 3 days in Kerala, 2 days in coastal Karnataka and on 1 day each in coastal Andhra Pradesh and Rayalaseema.

*Very heavy rain* occurred on 8 days in Tamil Nadu, 2 days in Kerala and on 1 day each in Orissa, coastal

TABLE 4

## Details of the weather systems during December 2006

S. No. (1)	System (2)	Duration (3)	Place of first location (4)	Direction of movement (5)	Place of final location (6)	Remarks (7)
<b>(A) Low pressure area</b>						
1.	Low pressure area	6-9	Tenasserim coast	West	Southeast Bay	It was seen as a trough of low on 6 morning over south Andaman Sea and adjoining Tenasserim coast. It again lay as a trough of low over southwest and adjoining southeast Bay on 10; which gradually moved westwards to Lakshadweep-Maldives areas and became less marked on 16
<b>(B) Western disturbances/eastward moving cyclonic circulations</b>						
<i>(i) Low pressure area</i>						
1.	At sea-level	5	North Pakistan and adjoining Afghanistan	Do	Northern parts of Jammu & Kashmir	Less marked on 6. Associated cyclonic circulation lay over Jammu & Kashmir and adjoining north Pakistan on 6. It moved away northeastwards on 8
<i>(ii) Upper air cyclonic circulations</i>						
1.	Mid tropospheric levels	3 - 4	North Pakistan and adjoining Jammu & Kashmir	Northeast	Jammu & Kashmir	Moved away on 5
2.	Do	9 - 11	North Pakistan and adjoining Jammu & Kashmir	Do	Do	Moved away on 12
3.	Do	12 - 14	Northeast Afghanistan and adjoining Pakistan	Do	Northern parts of Jammu & Kashmir	Moved away on 15
4.	Do	15 - 17	North Pakistan and neighbourhood	Do	Jammu & Kashmir	Moved away on 18
5.	Do	19 - 23	Afghanistan and adjoining north Pakistan	Do	Do	Moved away on 24
6.	Do	24 - 27	Pakistan and adjoining northeast Afghanistan	Do	Jammu & Kashmir and adjoining Pakistan	Moved away on 28
7.	Do	28 - 30	Northeast Afghanistan and adjoining north Pakistan	Do	Jammu & Kashmir and neighbourhood	Moved away on 31
8.	Do	31 Dec - 1 Jan	North Pakistan and adjoining Jammu & Kashmir	Do	Northern parts of Jammu & Kashmir	Moved away on 2 January
<i>(iii) Induced cyclonic circulations</i>						
1.	Mid tropospheric levels	4 - 7	Central Pakistan and adjoining Punjab & north Rajasthan	Northeast	Punjab and neighbourhood	Less marked on 8
2.	Do	10 - 11	Punjab and neighbourhood	Do	Himachal Pradesh and neighbourhood	Moved away on 12
3.	Do	20 - 21	Northwest Rajasthan and neighbourhood	Stationary	<i>In situ</i>	Became less marked on 22

TABLE 4(Contd.)

(1)	(2)	(3)	(4)	(5)	(6)	(7)
<i>(iv) Troughs in westerlies</i>						
1.	Mid & upper tropospheric levels	4 – 6	Long. 62° E to the north of Lat. 20° N	Northeast	Long. 70° E to the north of Lat. 25° N	Moved away on 7
2.	Do	20 – 21	Long. 65° E to the north of Lat. 25° N	East	Do	Less marked on 22
3.	Do	25 – 26	Long. 66° E to the north of Lat. 20° N	East	Do	Moved away on 27
<i>(C) Other cyclonic circulations</i>						
1.	Mid tropospheric levels	10 – 11	Southwest Bay off Tamil Nadu coast	Quasi-stationary	Tamil Nadu and adjoining Sri Lanka coasts	Less marked on 12
2.	Do	30 – 31	Nagaland, Manipur, Mizoram, Tripura and neighbourhood	Stationary	<i>In situ</i>	Less marked on 1 January
<i>(D) Troughs in easterlies</i>						
1.	Trough of low (sea level)	12 – 23	South Andaman Sea	West	Lakshadweep area and adjoining southeast Bay	Moved away on 24
2.	Do	14 – 15	Southwest Bay off Sri Lanka-south Tamil Nadu coasts	Do	Do	Less marked on 16
3.	Do	17 – 24	South Andaman Sea	Do	Maldives area and adjoining southeast Arabian Sea	Less marked on 25
4.	Do	25 – 29	Southwest Bay off Sri Lanka-Tamil Nadu coasts	Stationary	<i>In situ</i>	Less marked on 29 evening
5.	Do	30 Dec – 2 Jan	Andaman Sea	West	Southeast and adjoining southwest Bay	Less marked on 3 January

Andhra Pradesh, Rayalaseema and south interior Karnataka. *Heavy rain* occurred on: 13 days in Tamil Nadu; 7 to 8 days in coastal Andhra Pradesh and Kerala and on 1 to 3 days in Arunachal Pradesh, Orissa, Rayalaseema and Karnataka.

Rain or thundershowers occurred either *at most places* or *at many places* on: 8 to 10 days in Tamil Nadu, Kerala and Lakshadweep; 3 to 5 days in Andaman & Nicobar Islands, Arunachal Pradesh, Jammu & Kashmir, coastal Andhra Pradesh, Rayalaseema and Karnataka and on 1 to 2 days in West Bengal & Sikkim, Orissa, Punjab, Himachal Pradesh and Telangana. It occurred *at a few places* or *at isolated places* on: 18 to 22 days in Andaman & Nicobar Islands, Tamil Nadu and Kerala; 12 to 16 days in Assam & Meghalaya, Sub-Himalayan West Bengal &

Sikkim, Orissa, coastal Andhra Pradesh, Rayalaseema and coastal & south interior Karnataka; 8 to 11 days in Arunachal Pradesh, Nagaland-Manipur-Mizoram-Tripura, Konkan & Goa, Madhya Maharashtra, Telangana, north interior Karnataka and Lakshadweep; 4 to 7 days in Gangetic West Bengal, Madhya Pradesh, Gujarat region, Marathawada and Vidarbha and on 1 to 3 days in Jharkhand, Uttar Pradesh, Haryana, Punjab, Himachal Pradesh, Jammu & Kashmir, west Rajasthan and Saurashtra & Kutch.

### 3.2.3. Monthly rainfall

Monthly rainfall was: *excess* in 11 meteorological sub-divisions *viz.*, Arunachal Pradesh, Punjab, Jammu &

TABLE 5

Representative daily cumulative 24 hrs rainfall amounts during (October – December 2006)

Date	October	November	December
(1)	(2)	(3)	(4)
1.	Gharmura 13, Yeotmal 11, Nancowry 10, Ponda & Long Islands 9 each, Matijuri, Car Nicobar & Hut Bay 8 each, Lakhipur 7, Adilabad & Kailashahar 6 each, Metpalli, Karimganj & Akola 5 each, Amraghat, Annapurnaghat, Gulbarga, Sriramsagar, Silchar, Sanguem & Port Blair 4 each, Aska, Kodinar, Margao, Yercaud, Aurangabad & Shantiniketan 3 each, Mumbai, Honavar, Nasik, Arani, Itanagar, Ratnagiri, Jalgaon, Sholapur, Mahabaleshwar, Parbhani & Wardha 2 each, Gadag, Indore, Guna, Diamond Harbour, Dhanpura & Panjim 1 each	Machilipatnam 17, Chinnoor 12, Tiruppuvanam, Luxettipet & Rappale 10 each, Karimnagar 9, Kanjirapally, Huzurabad, Sircilla & Thuckalay 8 each, Ongole & Gannavaram 5 each, Bapatla 4, Kodaikanal, Adirampattinam, Ramagundam & Hut Bay 3 each, Medak 2, Medikeri, Palakkad, Minicoy, Amini Divi, Mahabaleshwar & Akola 1 each	Nancowry 2, Srimushnam, Muthupet, Tiruvarur & Adirampattinam 1 each
2.	Alibag 23, Mumbai 19, Marmugoa 15, Dabolim 14, Neora & Margoa 11 each, Miao & Guwahati 10 each, Panjim 9, Hut Bay & Bhira 8 each, Honavar 7, Gerusoppa, Bhagamandala & Dharampur 6 each, Ratnagiri, Valpoi, Gudalur Bazar, Jalgaon & Sathanur Dam 5 each, Chittoor, Songadh, Kendrapada & Barpeta 4 each, Kozhikode, Karwar, Miao, Thirumayam, Pudukottai, Bapatla, Jalpaiguri, Kherunighat, Dharamtul & Ahwa 3 each, Thrissur, Mahabaleshwar, Yercaud, Gingee, Pipli & Kolkata 2 each, Pune, Karipur, Omalur, Salem, Tiruttani, Gadag & Jhalawar 1 each	Dharmavaram 11, Molkalmuru, Gudibande, Srinivasapura & Mettupalayam 9 each, Rayadurg, Nilambur & Punalur 8 each, Chittur & Anantpur 7 each, Kothagiri 6, Cuddalore, Nellore & Jashpurnagar 5 each, Palakkad, Machilipatnam, Medikeri & Nancowry 4 each, Agathi & Karwar 3 each, Valparai 2, Coimbatore & Pune 1 each	Pachmarhi 1
3.	Nancowry 15, Panjim & North Lakhimpur 12 each, Honavar 11, Mumbai & Maya Bandar 10 each, Dabolim 9, Purnea, Hasimara & Karwar 8 each, Chennai & Jalpaiguri 7 each, Jhumpura & Itanagar 5 each, Jorhat 4, Tiruttani, Kolhapur 3, Cuttack 2, Harur, Arani, Arakonam, Ratnagiri, Tambaram & Betul 1 each	Kalyandurg 21, Parsurampura 18, Hosadurga 14, Avanigadda 11, Srisailam 10, Haunsbhavi & Gadag 9 each, Davangere & Channagiri 8 each, Kurnool & Chitradurga 6 each, Nagapattinam, Kodaikanal & Tuticorin 5 each, Valpoi, Adirampattinam & Karaikal 4 each, Cuddalore, Pondicherry, Hanamkonda, Washim, Karipur & Nellore 3 each, Ongole, Bhira, Agathi & Mahabaleshwar 2 each, Machilipatnam, Chennai, Amini Divi & Nagpur 1 each	Nagapattinam 3, Kupwara 1
4.	Sankalan 12, Purnea 7, Jeypore, Siliguri & Panjim 6 each, Karwar 5, Kolhapur, Nancowry & Port Blair 4 each, Koraput, Agartala, Panambur, Jalpaiguri & Dibrugarh 3 each, Mangalore & Medikeri 2 each, Basti, Tezu & Bhavani Sagar 1 each	Vellore 14, Srivaikuntam 12, Piravom 10, Lakkavalli & Nanguneri 7 each, Coonoor 5, Pamban, Ongole, Nancowry & Jagdalpur 4 each, Kodaikanal, Chennai & Nasik 3 each, Motala, Bangalore, Kannur, Pondicherry, Karaikal & Tambaram 2 each, Washim, Yeotmal & Sholapur 1 each	Solangnala 5, Banihal & Pahalgam 4 each, Udhampur, Batote & Dhundi 3 each, Quazigund, Srinagar & Patsio 2 each, Baderwah, Kupwara, Kanyakumari & Bhang 1 each
5.	Tiruvallur 16, Car Nicobar 11, Ketti, Pudukottai & Port Blair 9 each, Paradip & Maya Bandar 8 each, Tiruttani 7, Villupuram, Bhubaneswar & Kolkata 6 each, Cuttack, Gingee, Dhubri, Ongole & Tezpur 5 each, Sholingir & Mahabaleshwar 4 each, Dibrugarh, Tirukoilur, Honavar & Mumbai 3 each, Pendra, Karwar, Mangalore, Chennai, Vaniyambadi & Passighat 2 each, Shillong, Guwahati, Agartala, Thiruvananthapuram, Vellore & Cooch Behar 1 each	Malkangiri 10, Pudukottai, Mayiladuthurai & Pamban 8 each, Alangudi 7, Nedumbassery 5, Hyderabad 4, Minicoy, Kuchinda, Cuttack & Madurai 3 each, Kodaikanal & Tuticorin 2 each, Adirampattinam, Shirali, Bangalore, Jabalpur & Jagdalpur 1 each	Banihal 9, Batote 7, Baderwah & Quazigund 5 each, Katra 4, Jammu, Srinagar, Bhuntar, Kalpa & Una 2 each, Ayikudi, Nanguneri, Radhapuram, Kanyakumari, New Kandla, Amritsar, Mandi & Shimla 1 each
6.	Ratnagiri & Port Blair 14 each, Malda 10, Tiruvannamalai 8, Sathanur Dam, Vellore & Maya Bandar 7 each, Gudiyatham & Karwar 4 each, Kozhikode, Chengam, Sholingir & Dabolim 3 each, Salem & Arani 2 each, Chengalpattu, Ambur, Arakonam, Gingee, Dhubri & Pendra 1 each	Gudalur Bazar & Sangli 9 each, Sinner & Kolhapur 8 each, Belthangadi, Watrap & Sukinda 7 each, Ghatgaon & Agathi 4 each, Panambur & Chennai 3 each, Mahabaleshwar 2, Keonjhar, Mumbai & Balasore 1 each	Batote 7, Banihal 6, Quazigund 5, Tehri, Katra & Dehra Dun 2 each, Jammu, Kukernag, Ludhiana, Bhuntar & Shimla 1 each

TABLE 5(Contd.)

(1)	(2)	(3)	(4)
7.	Port Blair 16, Paravur 13, Thiruvananthapuram & Aurangabad 11 each, Nedumangad, Varkala, Nagathan & Cochi 8 each, Indi, Mancompu, Piravom, Cherthala & Mahabaleshwar 7 each, Nedumbassery, Sathanur Dam & Bijapur 5 each, Alapuzha 4, Pandharpur 3, Madurai, Kuzhithurai & Car Nicobar 3 each, Tirukoilur 2, Ulundurpet, Agartala & Ratnagiri 1 each	Avinasi & Suler 13 each, Periyanaikanpalyan, Tiruppuvanam & Srivilliputtur 12 each, Srivaikuntam 11, Arkalgud, Tiruchendur & Sivakasi 10 each, Pollachi & Nagercoil 9 each, Thiruvananthapuram 8, Konni & Madurai 7 each, Cochi & Paravur 6 each, Kottayam, Mandya & Mangalore 5 each, Coimbatore, Cuddalore & Puri 4 each, Aluva, Chittur & Cherthala 3 each, Palakkad & Thrissur 2 each, Imphal, Bangalore, Dabolim & Pune 1 each	Banihal & Quazigund 2 each, Srinagar, Pahalgam, Udhampur & Avantipur 1 each
8.	Bhatkal 18, CIAL Cochi 16, Munnar 14, Aluva & Chalakudy 12 each, Kozha & Kozhikode 11 each, Thiruvananthapuram & Dabolim 8 each, Dharmapuri & Kumta 7 each, Salem & Karipur 6 each, Musiri & Shirali 5 each, Palacode, Illuppur, Vallam & Honavar 4 each, Chettikulam, Attur, Karwar, Mangalore, Gadag & Anantpur 3 each, Bhavani, Thanjavur, Tiruchirapalli, Minicoy & Long Island 2 each, Coimbatore, Nagercoil, Krishnagiri & Tondi 1 each	Chengalpattu 14, Sriperumbudur 9, Usilampatti & Sholapur 7 each, Chennai & Tambram 5 each, Malkangiri & Krishnaprasad 4 each, Dholai, Nellore, Agathi, Puri & Gopalpur 3 each, Kolhapur & Mukteswar 1 each	Maya Bandar 9, Hut Bay 5, Port Blair 3, Long Island 1
9.	Ankola 13, Honnali & Tiruvannamalai 12 each, Venkatagiri 11, Bangarpet 10, Hosangara & Toludur 8 each, Harur, Kuppam, Honavar, Harur & Gerusoppa 7 each, Uthangarai & Panjim 6 each, Panruti, Palacode, Tirupattur & Salem 5 each, Dabolim, Karwar, Gadag, Agumbe & Lengpui 4 each, Cuddalore & Parbhani 3 each, Kottayam, Coonoor, Kodaikanal, Erode & Shillong 2 each, Avinashi, Jayamkondam, Tindivanam & Nellore 1 each	Visakhapatnam 12, Avinashi 11, Kosagumada 10, Aluva & Tuticorin 9 each, Sivakasi 8, Lazigarh & Thuckalay 7 each, Cochi, Nedumbassery & Palayamkottai 6 each, Nawarangpur & Kovilpatti 5 each, Amini Divi & Radhapuram 4 each, Sattur, Machilipatnam, Kanyakumari & Mahabaleshwar 3 each, Tirupattur, Aurangabad, Jagdalpur & Hut Bay 2 each, Madurai, Coimbatore, Panambur & Minicoy 1 each	Nancowry 1
10.	Matizuri 10, Agumbe & Dillighat 4 each, Kundha Bridge & Ottapidaram 3 each, Chickmagalur, Periyakulam, Virudhunagar, Karipur, Car Nicobar & Nancowry 2 each, Satara, Minicoy, Perungalur, Tiruppuvanam & Sivakasi 1 each	Ayikudi 8, Perundurai 7, Nilagiri, Erode, Suler & Coimbatore 6 each, Sattur, Boudh & Madurai 5 each, Sukinda 4, Kozhikode, Kaveli, Kakinada & Puri 3 each, Shillong & Balasore 2 each, Kolkata, Port Blair & Car Nicobar 1 each	Panruti 10, Parangipettai & Cuddalore 9 each, Sirkali 7, Chidambaram 6, Pondicherry 4, Vanur & Vridhachalam 3 each, Toludur, Mayiladuthurai & Karaikal 2 each, Nagapattinam & Kalpa 1 each
11.	Natham 8, Sholavandan, Dharamsthala & Lengpui 7 each, Suler, Tiruppur & Periyakulam 6 each, Nilakottai, Dharapuram & Mulanur 5 each, Kangeym, Karur Paramathi & Salem 4 each, Dindigul, Thuckalay, Usilampatti & Cochi 3 each, Minicoy, Pune, Chitradurga, Palani, Vidasandur, Nancowry & Jorhat 2 each, Vilathikulam & Shillong 1 each	Chandanpur 13, Coonoor 8, Parangipettai & Tiruvallur 7 each, Palayamkottai & Nagapattinam 6 each, Kharidwar, Thiruvananthapuram, Thuckalay & Kattumannarkoil 5 each, Ambasamudram 4, Rampurghat, Mundali, Ghatgaon, Tiruvallur & Cochi 3 each, Shillong, Chennai, NH-31, Basar & Keonjhar 2 each, Jamshedpur 1	Vandavasi 11, Pondicherry, Tiruvallur & Cuddalore 9 each, Kandukur 8, Gingee 7, Chengalpattu 5, Sriperumbudur 4, Arkonam, Arani, Polur, Baderwah & Dharamsala 3 each, Batote, Quazigund, Kukernag, Kashipur, Kaveli, Tehri, Sarsawa & Ghamroor 2 each, Nangal, Bhuntar, Hut Bay & Bahraich 1 each
12.	Alipurduar 9, Haldibari & Islampur 8 each, Gajoldoba, Muri, Chittampatti, Tiruppuvanam, Alapuzha 5, Cooch Behar, Barobhisa & Tirukoilur 4 each, Arundhutinagar, Sankalan, Sirkali, Rasipuram, Sivakasi, Car Nicobar, Dhubri, Cooch Behar & Cuddalore 3 each, Usilampatti, Uthamapalayam, Sattur, Ottapidaram, Karipur & Bhira 2 each, Panruti, Natham, Palani, Attur, Poondi, Tiruttani, Agathi, Medikeri, Cherrapunji & Malda 1 each	Pamban 8, Vedaranniyam & Alapuzha 5 each, Ottapidaram 4, Ramanathapuram, Basar & Kupwara 3 each, NH-31, Miao, Gulmarg, Chennai, Karaikal, Watrap & Maya Bandar 2 each, Dharmatul, Mellabazar, Guwahati, Shillong & Tezpur 1 each	Venkatagiri, Kattumannarkoil & Cuddalore 11 each, Srikalahasti & Mayiladuthurai 10 each, Vandavasi & Tiruvallur 9 each, Panruti, Coonoor, Tirukoilur & Arkonam 8 each, Poondi, Kovilpatti, Sirkali & Tiruttani 6 each, Srimushnam, Sriperumbudur, Jayamkondam

TABLE 5(Contd.)

(1)	(2)	(3)	(4)
			& Karaikal 5 each, Ketti, Kundha Bridge, Papanasam, Keeranur & Pondicherry 4 each, Parangipettai, Toludur, Kothagiri & Arani 3 each, Chennai, Tondi, Cuddalore & Nellore 2 each, Nagapattinam, Pamban, Kasol & Nancowry 1 each
13.	Madurai 9, Ramanathapuram 6, Tirumangalam & Kodaikanal 5 each, Tenkasi 4, Kamuthi, Tondi & Tiruvarur 3 each, Kottayam, Sankalan, Dharamsala, Nilakottai, Sivakasi, Punalur & Kolkata 2 each, Annur, Coimbatore, Gangtok, Krishnanagar, Palampur & Port Blair 1 each	Karaikal 4, Tada 11, Satyavedu 9, Parangipettai & Ponneri 8 each, Nannilam, Sullurpet & Red Hills 7 each, Chidambaram & Tiruvarur 6 each, Sivakasi 5, Karaikal, Kupwara, Shenkottah & Vallam 4 each, Adirampattinam, Nagapattinam & Tondi 3 each, Sirkali, Sivaganga, Tambaram, Maya Bandar, Srinagar & Nellore 2 each, Palayamkottai 1	Passighat 4, Virudhachalam 3, Miao, Tezu, Ambasamudram 2, Daporijo, Chouldhowaghat, Toludur, Mylaudi, Kundha Bridge, Car Nicobar & Coonoor 1 each
14.	Hut Bay 7, Majbhat & Mudukulathur 4 each, Dindigul, Berhampore, Bhalukpong, Car Nicobar & Agartala 3 each, Kolkata, Nakashipara, Burdwan, Malkapur, Banihal, Mangalore, Panambur, Lengpui, Miao, Doda, Nandigram, Pingla & Pamban 2 each, Minicoy, Thiruthuraipoondi, Amritsar, Batote & Bhaderwah 1 each	Chidambaram 11, Kaveli 8, Pamban & Nanguneri 6 each, Parangipettai 5, Mannargudi 4, Coonoor & Kattumannarkoil 3 each, Long Island & Nellore 2 each, Imphal, Karaikal, Cuddalore & Hut Bay 1 each	Chidambaram 11, Car Nicobar, Hut Bay, Nancowry & Agathi 1 each
15.	Karipur 7, Toludur & Shenkottah 6 each, Uluberia, Natham & Cochi 5 each, Kodaikanal, Attur & Thodupuzha 4 each, Thuckalay, Ambasamudram, Thuraiyur, Barackpur, Bhalukpong, Minicoy, Hut Bay & Long Islands 3 each, Diamond Harbour, Panjim, Pullambadi & Narsapur 2 each, Nandigram, Jalanjanj, Tangla, Eraniel, Thoovalai, Shillong & Agartala 1 each	Karipur & Ongole 10 each, Shenkottah 8, Kothagiri, Ayikudi & Tenkasi 4 each, Panruti, Kunda Bridge & Tondi 3 each, Pondicherry, Ramanathapuram, Kozhikode, Cochi, Kodaikanal & Pamban 2 each, Red Hills, Ariyalur, Tiruvarur, Kaveli, Nancowry & Chennai 1 each	Shenkottah 8, Hut Bay 5
16.	Sattur 10, Coonoor 8, Puttur, Basar & Kothagiri 7 each, Punalur, Ayikudi, Shenkottah & Watrap 6 each, Karipur, Thuckalay & Sivakasi 5 each, Palakkad, Daporijo, Kundhabridge & Tondi 4 each, Coimbatore, Cooch Behar, Parangipettai & Nannilam 3 each, Tiruppur, Ketti & Narsapur 2 each, Gajoldoba, Jalpaiguri, Hasimara, Salem, Dhubri, Cuddalore, Palayamkottai & Tiruchirapalli 1 each	Parangipettai 13, Thiruthuraipoondi & Srimushnam 9 each, Kaveli 8, Ramanathapuram & Valangaiman 7 each, Karaikal & Tondi 6 each, Pamban 5, Coonoor, Tiruvadanai & Tirupathi 4 each, Pondicherry, Nagapattinam, Vellore, Sathankulam, Tiruchendur & Ongole 3 each, Gulmarg, Cuddalore, Hut Bay, Car Nicobar & Chennai 2 each, Srinagar, Quazigund, Chennai, Minicoy, Banihal & Batote 1 each	Nil
17.	Coonoor & Ketti 15 each, Tuticorin 12, Kothagiri, Shenkottah & Ayikudi 10 each, Adirampattinam 9, Paravur & Kunda Bridge 8 each, Tenkasi, Kavipatti & Palayamkottai 7 each, Ambasamudram 6, Sankarankoil 5, Punalur, CIAL Cochi & Sivakasi 4 each, Madurai & Watrap 3 each, Narsapur 2, Tondi, Mangalore & Dhubri 1 each	Port Blair 3, Vedaranniyam & Kupwara 2 each, Nellore, Red Hills, Vellore & Alapuzha 1 each	Nancowry 4
18.	Coonoor 8, Koraput & Ketti 5 each, Daporijo, Tirupathi & Tondi 4 each, Kunda Bridge & Omalur 3 each, Mettupalayam, Ariyalur, Mudukulathur, Salem, Yercaud, Tiruchirapalli & Narsapur 2 each, Bhograi, Purushottampur, Panagarh, Uluberia, Barackpur, Avinashi Erode, Natham, Rasipuram, Madurai, Paramathy, Manaparai, Kovilpatti & Vilathikulam 1 each	Toludur 14, Panruti 13, Sirkali 11, Kattumannarkoil 9, Tiruvarur & Punalur 8 each, Srimushnam, Thammanpatti, Villupuram, Ulundurpet & Gingee 7 each, Perambalur, Valangaiman, Tirukoilur & Kanyakumari 6 each, Tiruchirapalli & Nagapattinam 5 each, Yercaud, Thanjavur, Tiruvaiyaru, Chennai & Pondicherry 4 each, Adirampattinam, Vanur, Cuddalore, Karaikal, Kodaikanal, Narsapur, Tirupathi, Banihal & Batote 3 each, Quazigund & Pahalgam 2 each, Coimbatore, Tondi, Madurai, Salem & Srinagar 1 each	Nil

TABLE 5(Contd.)

(1)	(2)	(3)	(4)
19.	Thiruvananthapuram 14, Coonoor 11, Ottapidaram & Srivaikuntam 9 each, Ramanathapuram & Palayamkottai 8 each, Piravom & Tuticorin 7 each, Shenkottah & Ayikudi 6 each, Toludur, Tenkasi, Uluberia, Kundhabridge & Chennai 5 each, Kanyakumari 4, Dharapuram & Vallam 3 each, Watrap, Pamban, Vellore, Nagapattinam, Puri & Bareilly 2 each, Tondi 1	Avinashi 12, Coonoor 11, Paravur 10, Haripad, Hosdurg, Srikalahasti & Nellore 9 each, Piravom & Pollachi 8 each, Idukki, Kollam, Udayagiri, Bhavani & Nedumbassery 7 each, Erode, Ketti, Kothagiri & Vanur 6 each, Red Hills, Sriperumbudur & Cochi 5 each, Kannur, Alapuzha, Mangalore, Mysore & Chennai 4 each, Suler, Mettupalayam, Polur, Papanasam & Coimbatore 3 each, Shenkottah, Manapara, Gudiyatham, Tirupathi, Batote & Thiruvananthapuram 2 each, Agathi & Pahalgam 1 each	Imphal 2
20.	Shenkottah 9, Mancompu 7, Unnao, Tuticorin & Jammu 6 each, Malkapur, Chidambaram, Red Hills & Sholavandan 5 each, Mettupatti, Tirumayam, Laikera, Rairakhol, Tiruchirappalli & Bikaner 4 each, Bagati, Barackpur, Kohima, Bhopal, Dharamsala, Alangudi, Sattur, Lalgudi, Kodavasal, Alapuzha, Katra, Sambalpur, Allahabad & Kolkata 3 each, Mangalore, Chennai, Sirkali, Nannilam, Ottapidaram, Ambikapur & Amritsar 2 each, Narsapur, Bankura, Cuddalore, Pondicherry, Maya Bandar, Amini Divi, Thanjavur, Karaikal, Kupwara & Lengpui 1 each	Passighat 7, Coonoor & Tirupathi 5 each, Sibsagar & Kothagiri 4 each, Pochampalli, Shenkottah, Tezu & Palayamkottai 3 each, Annur, Mettupalayam, Kodumudi, Chennai, Gangtok & Tadong 2 each, Ketti, Kundha Bridge, Agathi, Anantpur, Tezpur, Jorhat & Miao 1 each	Nil
21.	Coonoor 11, Palayamkottai 9, Sholavandan 8, Nathan & Kothagiri 7 each, Goalpara & Kodumudi 6 each, Tiruppuvanam, Melur, Chittampatti, Tehri, Sevoke, Uluberia, Kannur, Paonta, Kherunighat & Bhagalpur 5 each, Usilampatti, Sivakasi, Tondi & Tuticorin 4 each, Pamban, Pondicherry, Amritsar, Muzaffarpur, Allahabad, Bhograi, Sambalpur & Cooch Behar 3 each, Cuddalore, Mangalore, Jalpaiguri, Jammu, Karipur, Alapuzha, Ambikapur, Nancowry, Thiruvananthapuram & Tezpur 2 each, Coimbatore, Srinagar, Chennai, Amini Divi, Shimla & Guwahati 1 each	Shenkottah 12, Chidambaram 8, Parangipettai & Kattumannarkoil 7 each, Mayiladuthurai & Tuticorin 6 each, Sirkali, Mangalore, Karaikal, Hasimara & Tondi 5 each, Toludur, Bhavani & Tenkasi 4 each, Jayamkondan, Mannargudi, Panambur, Kannur & Kanyakumari 3 each, Yercaud, Papanasam, Tiruvaiyaru, Lakhi Road, Beki Road & Amini Divi 2 each, Pondicherry, Thiruvananthapuram & Cuddalore 1 each	Quazigund, Pahalgam, Kaveli, Banihal & Pamban 1 each
22.	Sevoke & Sitapur 6 each, Champasarai & Nedumbassery 4 each, Coonoor, Nagrakata, Aizwal, Karaikal, Koraput & Chennai 3 each, Khanitar, Gwalior, Pamban, Minicoy, Tirupathi & Bahraich 2 each, Gorakhpur, Nagapattinam, Agathi, Pondicherry, Miao & Gangtok 1 each	Aluva & Tiruchendur 15 each, Uthamapalayam 11, Tuticorin 10, Nedumbassery, Srivilliputtur, CIAL Cochi, Sivakasi & Thiruvananthapuram 8 each, Shenkottah 7, Palani & Watrap 5 each, Ayikudi & Kodaikanal 4 each, Srivaikuntam, Virudhunagar, Rajgarh & Palayamkottai 3 each, Tondi, Pamban, Amini Divi, Batala, Sri Ganganagar, Minicoy & Kupwara 2 each, Patiala, Shimla, Agathi, Sundernagar & Amritsar 1 each	Banihal 2, Quazigund, Pahalgam & Batote 1 each
23.	Thuckalay 9, Kulithalai & Ambasamudram 8 each, Palayamkottai 6, Nedumbassery 4, Parangipettai & Lucknow 3 each, Safipur, Jalalabad & Mukteshwar 2 each, Cuddalore, Karaikal, Cochi, Thiruvananthapuram & Nagapattinam 1 each	Ambasamudram 7, Agathi, Panambur & Tondi 4 each, Bhalukpong, Sattur, Amini Divi, Palayamkottai & North Lakhimpur 3 each, Itanagar, Chouldhowaghat, Tuticorin & Tiruvadana 2 each, Tissa, Sibsagar, Passighat, Bhuntar, Mangalore, Kannur, Thiruvananthapuram & Banihal 1 each	Kukernag 2
24.	Parangipettai 11, Pamban 10, Namakkal 9, Chengalpattu, Thambaram & Chidambaram 7 each, Agathi 3, Tikarpada & Minicoy 2 each, Shillong, Chennai, Cuddalore & Pondicherry 1 each	Koppa, Suler & Coimbatore 7 each, Sankalan 4, Bhalukpong & Itanagar 3 each, Khonsa, Amini Divi, Passighat & Dibrugarh 2 each, Miao, Chouldhowaghat, North Lakhimpur & Mahabaleshwar 1 each	Nil

TABLE 5(Contd.)

(1)	(2)	(3)	(4)
25.	Ramanathapuram 28, Namakkal 14, Nannilam 7, Karaikal & Hut Bay 6 each, Adirampattinam 4, Cochi, Pondicherry & Nagapattinam 3 each, Alapuzha, Cuddalore, Pamban & Chennai 2 each, Nancowry, Tuticorin & Shillong 1 each	Kanjirapally & Thiruvananthapuram 7 each, Tezu, Belgaum & Passighat 4 each, Kolhapur 3, Naduvattam & Ratnagiri 2 each, Pune, Ketti, Dibrugarh & North Lakhimpur 1 each	Nil
26.	Red Hills & Chennai 14 each, Tada 12, Tiruvallur, Gudur, Tambaram & Ponneri 11 each, Parangipettai, Sirkali & Ramanathapuram 10 each, Chidambaram 9, Poondi & Tiruvarur 8 each, Sullurpet, Srikalahasti, Chengalpattu, Mayiladuthurai, Vedaranniyam, Papanasam, Cuddalore & Nellore 7 each, Paramakudi & Tindivanam 6 each, Pondicherry 5, Vanur, Kaveli, Dharmapuri, Palayamkottai, Adirampattinam & Tirupathi 4 each, Kanchipuram, Aranthangi, Tirumayam & Vellore 3 each, Pamban, Salem & Port Blair 2 each, Coonoor, Kozhikode, Amini Divi, Nancowry & Maya Bandar 1 each	Sattankulam 6, Aurangabad 4, Nanguneri & Passighat 3 each, Changlong, Kulithalai, Musiri & Srivaikuntam 2 each, Zero, Seppa, Rajghat, Chindwara, Malanjhand, Nagercoil & Kanyakumari 1 each	Kupwara 1
27.	Parangipettai 14, Cuddalore 12, Sirkali, Kanchipuram 11, Sattankulam & Nagapattinam 10 each, Muthupet 9, Jayamkondan, Kumbakonam & Tuticorin 7 each, Kattumannarkoil, Mayiladuthurai, Vedaranniyam & Visakhapatnam 6 each, Adirampattinam, Pondicherry, Cochi, Thiruvananthapuram & Pamban 5 each, Tambaram, Valangaiman & Ambasamudram 4 each, Dindigul, Pullambadi, Chittampatti, Kottayam, Tondi, Chennai & Machilipatnam 3 each, Tirupathi, Palayamkottai & Port Blair 2 each, Alapuzha, Minicoy & Nellore 1 each	Sattankulam 13, Nanguneri 11, Tiruchendur 8, Radhapuram 7, Mylaudi & Kanyakumari 6 each, Parangipettai 5, Thuckalay & Valangaiman, Nagapattinam 4 each, Kuzhithurai, Nagercoil & Thiruvananthapuram 3 each, Eraniel, Usilampatti, Sirkali, Aranthangi & Tiruchirapalli 2 each, Coonoor, Paramakudi, Balaghat, Vallam, Palayamkottai & Madurai 1 each	Pahalgam, Katra, Banihal & Baderwah 2 each, Jammu, Quazigund & Batote 1 each
28.	Panruti 16, Kovilpatti 15, Parangipettai, Kollam & Chennai 14 each, Cuddalore & Pamban 12 each, Chidambaram, Kanchipuram & Palasa 11 each, Tambaram & Pondicherry 10 each, Red Hills, Avani-gadda, Ramanathapuram & Kaveli 9 each, Srivilliputtur & Nellore 8 each, Tondi, Tuni, Punalur, Kottayam & Machilipatnam 7 each, Karaikal, Villupuram, Thiruvananthapuram & Cuddalore 6 each, Watrap, Sivakasi & Ongole 5 each, Vandavasi, Vilathikulam & Nalgonda 4 each, Poondi & Yercaud 3 each, Coimbatore, Ottapidaram, Alapuzha & Tirupathi 2 each, Kozhikode 1	Pudukottai, Sivaganga & Kottayam 4 each, Avinashi, Coonoor & Thirumayam 3 each, Chidambaram, Thiruvananthapuram, Dindigul, Natham, Erode & Tiruchirapalli 2 each, Ketti, Alangudi, Musiri, Madurai & Gadag 1 each	Dhollabazar, Mellabazar, Itanagar, Bhalukpong, Dibrugarh, Gangtok & Tadong 1 each
29.	Ongole & Chennai 19 each, Tiruvallur 18, Kovilpatti 15, Amalapuram, Kakinada, Kandukur & Red Hills 13 each, Kayamkulam & Erode 12 each, Sholavandan & Cuddalore 11 each, Avani-gadda & Vanur 10 each, Chennai & Pondicherry 9 each, Villupuram & Parangipettai 8 each, Ketti, Thiruvananthapuram, Nagapattinam & Karaikal 7 each, Yercaud, Kottayam & Karipur 6 each, Chengalpattu, Tiruvarur & Kattumannarkoil 5 each, Kovilpatti, Alapuzha & Mangalore 4 each, Machilipatnam & Kalingapatnam 3 each, Kakinada, Cochi & Maya Bandar 2 each, Hut Bay, Bangalore & Pendra 1 each	Mahabaleshwar, Pune & Cannur 2 each, Avinashi, Illuppur, Keeranur, Kozhikode & Nancowry 1 each	Car Nicobar 2, Nancowry 1
30.	Avani-gadda 35, Repalle 28, Machilipatnam 27, Bapatla 20, Amalapuram 16, Kakinada & Narsapur 15 each, Tenali 12, Ongole 8, Visakhapatnam 7, Thiruvananthapuram 5, Cove long, Kottayam & Alapuzha 4 each, Kothagiri, Poondi, Palacode & Tiruvadani 3 each, Vellore, Attur, Ambur & Medikeri 2 each, Kochi, Madurai & Car Nicobar 1 each	Nancowry 4, Pendra, Parangipettai & Ramanathapuram 1 each	Nil
31.	Gudivada 55, Machilipatnam 34, Avani-gadda 32, Narsapur 22, Repalle & Gannavaram 19 each, Kaikelur 16, Amalapuram 15, Bhimavaram 14, Mangalagiri 13, Bapatla 12, Bhavani Sagar 8, Kakinada & Karipur 7 each, Gobichettipalayam 6, Ambasamudram, Periyanaikanpalyan & Kozhikode 5 each, Nilakottai, Ketti & Kannur 4 each, Kodaikanal, Srivilliputtur, Senkottai & Palayamkottai 3 each, Coonoor, Namakkal, Coimbatore & Ongole 2 each, Watrap, Kothagiri, Lalgudi, Thethiengapet & Thiruthurai-poondi 1 each	-	Nil



Kashmir, Chattisgarh, Telangana, Rayalaseema, Tamil Nadu, coastal Karnataka, south interior Karnataka, Kerala and Lakshadweep; *normal* in 5, *viz.*, Sub-Himalayan West Bengal & Sikkim, Orissa, Vidarbha, coastal Andhra Pradesh and north interior Karnataka; *deficient* in 6, *viz.*, Assam & Meghalaya, Gangetic West Bengal, Bihar, Haryana, Himachal Pradesh and east Madhya Pradesh and *scanty* in the remaining 14, *viz.*, Andaman & Nicobar Islands, Nagaland-Manipur-Mizoram-Tripura, Jharkhand, east Uttar Pradesh, west Uttar Pradesh, Uttaranchal, west Rajasthan, east Rajasthan, west Madhya Pradesh, Gujarat Region, Saurashtra, & Kutch, Konkan & Goa, Madhya Maharashtra and Marathawada. The significant amounts of rainfall during the month are given in Table 5.

### 3.2.4. Temperature

*Cold wave conditions* prevailed on 1 to 3 days in parts of Punjab and Rajasthan.

Night temperatures were *appreciably to markedly below normal* on 3 to 4 days in Assam & Meghalaya, Orissa, Bihar and east Uttar Pradesh and on 1 to 2 days in Arunachal Pradesh, Nagaland-Manipur-Mizoram-Tripura, Sub-Himalayan West Bengal & Sikkim, Jharkhand, Haryana, Punjab, Himachal Pradesh, Saurashtra & Kutch and coastal Andhra Pradesh and were *below normal* on 3 to 5 days in Orissa, Haryana, Punjab, Himachal Pradesh, Jammu & Kashmir, Saurashtra & Kutch and Madhya Maharashtra and on 1 to 2 days in Arunachal Pradesh, Assam & Meghalaya, Sub-Himalayan West Bengal & Sikkim, east Uttar Pradesh, Uttaranchal, Rajasthan, Gujarat region, Konkan & Goa, Marathawada, Tamil Nadu, coastal & south interior Karnataka and Kerala. They were *appreciably to markedly above normal* on: 25 to 27 days in east Rajasthan and east Madhya Pradesh; 20 to 24 days in Uttar Pradesh, Haryana, west Rajasthan, west Madhya Pradesh, Gujarat region and Madhya Maharashtra; 14 to 18 days in Assam & Meghalaya, Nagaland-Manipur-Mizoram-Tripura, Jharkhand, Bihar, Punjab, Saurashtra & Kutch, Marathawada, Vidarbha, Chattisgarh and Telangana; 8 to 10 days in West Bengal & Sikkim, Orissa, Jammu & Kashmir, Konkan & Goa, Rayalaseema and coastal Karnataka; 4 to 7 days in Arunachal Pradesh, Uttaranchal and north interior Karnataka and on 1 to 3 days in Himachal Pradesh, coastal Andhra Pradesh and south interior Karnataka and were *above normal* on: 11 to 14 days in Saurashtra & Kutch, Konkan & Goa, coastal Andhra Pradesh and Rayalaseema; 7 to 10 days in Sub-Himalayan West Bengal & Sikkim, Orissa, Vidarbha, Tamil Nadu and

Karnataka; 4 to 6 days in Assam & Meghalaya, Gangetic West Bengal, Jharkhand, Bihar, east Uttar Pradesh, Himachal Pradesh, Jammu & Kashmir, Gujarat region, Madhya Maharashtra, Marathawada, Chattisgarh and Telangana and on 1 to 3 days in Arunachal Pradesh, Nagaland-Manipur-Mizoram-Tripura, west Uttar Pradesh, Uttaranchal, Haryana, Punjab, Rajasthan, Madhya Pradesh and Kerala.

Month's lowest minimum temperature in the plains of the country was 3.0° C recorded at Sarsawa (west Uttar Pradesh) on 29 November 2006.

### 3.2.5. Disastrous weather events and associated damage

Lightning, heavy rains and landslides claimed 8 lives in Tamil Nadu, 4 in Kerala and 3 in Madhya Pradesh. Landslides occurred in many parts of coastal Tamil Nadu and about 7 bridges were washed away in flood waters. Low lying areas in Kerala were also flooded and electric and telecommunication lines were damaged. In Karnataka, many old trees were uprooted, the crops ready for harvesting like paddy, arecanut, cotton etc. were badly affected and also low lying areas were inundated, disrupting the traffic. *Heavy rains* damaged 3 lakh acres of crops in Andhra Pradesh. Thunder storm/ hail storm also created havoc in various parts of Maharashtra. Many acres of grape and cotton crops were damaged by hail and heavy rains. A cloud burst accompanied by hail storm and lightning hit many parts of Marathawada claiming the lives of 10 villagers.

## 3.3. December

### 3.3.1. Storms and Depressions

During the month, there was no Cyclonic Storm or Depression formed over the Bay of Bengal and the Arabian Sea.

### 3.3.2. Weather and associated synoptic features

Table 4 gives the summary of synoptic systems during the month of December 2006.

Northeast monsoon was *vigorous* on 1 day in Tamil Nadu.

*Heavy rain* occurred on: 3 days in Tamil Nadu; 2 days each in Jammu & Kashmir and Rayalaseema and on 1 day each in Andaman & Nicobar Islands, Uttaranchal and coastal Andhra Pradesh. Northeast monsoon rains ceased on 28 December.

Rain or thundershowers occurred either *at most places* or *at many places* on: 7 days in Jammu & Kashmir; 3 days in Himachal Pradesh and on 1 day each in Andaman & Nicobar Islands, Arunachal Pradesh, Uttaranchal, Punjab, Tamil Nadu and Lakshadweep. It occurred *at a few places* or *at isolated places* on: 11 days in Tamil Nadu; 5 to 8 days in Andaman & Nicobar Islands, Sub-Himalayan West Bengal & Sikkim, Himachal Pradesh, Jammu & Kashmir, coastal Andhra Pradesh and Rayalaseema; 4 days in Kerala and on 1 to 3 days in Arunachal Pradesh, Nagaland-Manipur-Mizoram-Tripura, west Uttar Pradesh, Uttaranchal, Haryana, Punjab, west Rajasthan, west Madhya Pradesh, Madhya Maharashtra, south interior Karnataka and Lakshadweep.

### 3.3.3. Monthly rainfall

Monthly rainfall was: *excess* in only 1 Meteorological sub-division viz. Jammu & Kashmir; *normal* in 1, viz., Uttaranchal; *deficient* in 9 viz., Andaman & Nicobar Islands, Arunachal Pradesh, Sub-Himalayan West Bengal & Sikkim, Haryana, Punjab, Himachal Pradesh, west Rajasthan, Saurashtra & Kutch and Rayalaseema and *scanty* in 16 viz., Assam & Meghalaya, Nagaland-Manipur-Mizoram-Tripura, Bihar, east Uttar Pradesh, west Uttar Pradesh, east Rajasthan, west Madhya Pradesh, east Madhya Pradesh, Madhya Maharashtra, Chattisgarh, coastal Andhra Pradesh, Tamil Nadu, coastal Karnataka, south interior Karnataka, Kerala and Lakshadweep. There was no rain in the remaining 9 sub-divisions viz., Gangetic West Bengal, Orissa, Jharkhand, Gujarat Region, Konkan & Goa, Marathawada, Vidarbha, Telangana and north interior Karnataka. The significant amounts of rainfall during the month are given in Table 5.

### 3.3.4. Temperature

*Cold wave* conditions prevailed on: 4 to 6 days in Punjab and west Rajasthan and on 1 to 3 days in Orissa, east Uttar Pradesh, Uttaranchal, Haryana, Himachal Pradesh, Jammu & Kashmir and east Rajasthan. *Cold day* conditions prevailed on 1 day each in west Uttar Pradesh and Uttaranchal.

Night temperatures were *appreciably below normal* on: 4 to 8 days in Orissa, Jharkhand, Punjab, west Rajasthan, Madhya Maharashtra, Marathawada, Tamil Nadu and interior Karnataka and on 1 to 3 days in Assam & Meghalaya, Nagaland-Manipur-Mizoram-Tripura, Bihar, east Uttar Pradesh, Uttaranchal, Haryana, Himachal Pradesh, Jammu & Kashmir, east Rajasthan, Madhya Pradesh, Gujarat State, Konkan & Goa, Vidarbha, Chattisgarh, Andhra Pradesh and coastal Karnataka and were *below normal* on: 9 days each in west Rajasthan and Kerala; 4 to 8 days in Assam & Meghalaya, Orissa, east Uttar Pradesh, Punjab, east Rajasthan, Konkan & Goa, Madhya Maharashtra, Vidarbha, Rayalaseema, Tamil Nadu and interior Karnataka and on 1 to 3 days in Nagaland-Manipur-Mizoram-Tripura, West Bengal & Sikkim, Jharkhand, west Uttar Pradesh, Uttaranchal, Haryana, Jammu & Kashmir, Madhya Pradesh, Gujarat region, Saurashtra & Kutch, Marathawada, Chattisgarh, coastal Andhra Pradesh, Telangana and coastal Karnataka. They were *appreciably to markedly above normal* on: 18 to 20 days in west Rajasthan, west Madhya Pradesh and Gujarat region; 11 to 17 days in Assam & Meghalaya, Sub-Himalayan West Bengal & Sikkim, Haryana, east Rajasthan, east Madhya Pradesh, Saurashtra & Kutch, Madhya Maharashtra, Marathawada and Vidarbha; 4 to 10 days in Gangetic West Bengal, Orissa, Jharkhand, Bihar, Uttar Pradesh, Uttaranchal, Punjab, Himachal Pradesh, Jammu & Kashmir, Konkan & Goa, Chattisgarh, coastal Andhra Pradesh, Telangana, Rayalaseema, coastal Karnataka and on 2 days each in Tamil Nadu and south interior Karnataka and were *above normal* on: 10 to 12 days in Assam & Meghalaya, Konkan & Goa, coastal Andhra Pradesh and Tamil Nadu; 4 to 9 days in Nagaland-Manipur-Mizoram-Tripura, West Bengal & Sikkim, Orissa, Jharkhand, Bihar, east Uttar Pradesh, Uttaranchal, Rajasthan, Madhya Pradesh, Gujarat state, Madhya Maharashtra, Marathawada, Vidarbha, Telangana, Rayalaseema and coastal Karnataka and on 1 to 3 days in Arunachal Pradesh, west Uttar Pradesh, Haryana, Punjab, Himachal Pradesh, north interior Karnataka and Kerala.

The month's and season's lowest minimum temperature in the plains of the country was 0.9° C recorded at Ludhiana (Punjab) on 30 December 2006.

### 3.3.5. Disastrous weather events

*Cold wave* claimed the lives of 62 people in Uttar Pradesh. Road/ rail transports and flight operations were disrupted for many days by dense fog in the major cities of north India including Delhi.

**Appendix****Definitions of the terms given in 'Italics'****Rainfall**

<i>Excess</i>	- percentage departure from normal is + 20% or more.
<i>Normal</i>	- percentage departure from normal is -19 % to + 19 %.
<i>Deficient</i>	- percentage departure from normal is -20 % to -59 %.
<i>Scanty</i>	- percentage departure from normal is -60 % to -99 %.
<i>Heavy rain</i>	- rainfall amount from 6.5 cm to 12.4 cm.
<i>Very heavy rainfall</i>	- rainfall amount 12.5 cm to 24.4 cm.
<i>Extremely heavy rain</i>	rainfall amount 24.5 cms and above.
<i>At most places</i>	- 75 % or more stations of a meteorological sub-division reporting at least 2.5 mm rainfall.
<i>At many places</i>	- 51% to 74 % stations of a meteorological sub-division reporting at least 2.5 mm rainfall.
<i>At a few places</i>	- 26 % to 50% stations of a meteorological sub-division reporting at least 2.5 mm rainfall.
<i>At isolated places</i>	- 25% or less stations of a meteorological sub-division reporting at least 2.5 mm rainfall.

**Monsoon activity****(a) Southwest monsoon**

<i>Vigorous</i>	- rainfall exceeding 4 times the normal with, at least two stations reporting rainfall more than or equal to 8 cm along the west coast and 5 cm elsewhere. Rainfall in that sub-division should be fairly widespread or widespread.
<i>Active</i>	- rainfall more than 1½ to 4 times the normal, with at least two stations reporting rainfall more than or equal to 5 cm along the west coast and 3 cm elsewhere. Rainfall in that sub-division should be fairly widespread or widespread.

**(b) Northeast monsoon**

<i>Vigorous</i>	- rainfall exceeding 4 times the normal with at least two stations reporting rainfall more than or equal to 5 cm in coastal Tamil Nadu and south coastal Andhra Pradesh and 3 cm elsewhere in the northeast monsoon region. Rainfall in that sub-division should be fairly widespread or widespread.
<i>Active</i>	- rainfall more than 1½ to 4 times the normal, with at least two stations reporting rainfall more than or equal to 3 cm in coastal Tamil Nadu and south coastal Andhra Pradesh and 2 cm elsewhere in the northeast monsoon region. Rainfall in that sub-division should be fairly widespread or widespread.

**Temperatures****(a) Maximum / Day temperature**

<i>Markedly above normal</i>	- departure from normal is +5° C to +6° C (where the normal maximum temperature is 40° C or less).
<i>Appreciably above normal</i>	- departure from normal is +3° C to +4° C (where the normal maximum temperature is 40° C or less).
<i>Above normal</i>	- departure from normal is +2° C.
<i>Normal</i>	- departure from normal +1° C to -1° C.

**(b) Minimum / Night temperature**

<i>Cold wave conditions</i>	- when the wind chill effective minimum temperature ( $WCT_n$ ) is 10° C or less: For stations whose normal minimum temperature is $\geq 10^\circ$ C, when the departure from normal is - 5° to - 6° C, and for stations whose normal minimum temperature is less than 10° C when the departure from normal is -4° to -5° C. Also when $WCT_n$ is $\leq 0^\circ$ C, cold wave is declared irrespective of the departure for those stations whose normal minimum temperature is greater than 0° C.
-----------------------------	---

<i>Cold day conditions</i>	For inland plain stations, when the day temperature is less than or equal to 16° C.	<i>Appreciably below normal</i>	- departure from normal is between -3° C to -4° C (where the normal minimum temperature is 10° C or more).
<i>Markedly below normal</i>	- departure from normal is -5° C to -6° C (where the normal minimum temperature is 10° C or more).	<i>Below normal</i>	- departure from normal is -2° C.
		<i>Normal</i>	- departure from normal is +1° C to -1° C.

---